

### Triple play

The STS-76 crew documents the third docking of a shuttle to the Russian Mir Space Station. Photos on Page 3.



### Science Fair

JSC employees took time out last month to judge Science Fair projects. Story on Page 4.

# Space News Roundup

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No. 15

## Endeavour at pad, on track for mid-May launch

By James Hartsfield

*Endeavour* was rolled out to Launch Pad 39B at Kennedy Space Center on Tuesday in preparation for STS-77, which remains on track for a mid-May liftoff.

*Endeavour* was moved out of the Vehicle Assembly Bldg. at 9 a.m. Tuesday where it had been mated with the STS-77 solid rockets and fuel tank, and the shuttle was at the pad by 3 p.m. Late this week, technicians completed a flight readiness test of *Endeavour's* main engines, a check of the engines' electrical connections and pneumatic valves. A standard leak check of the main engine plumbing is scheduled for Monday.

*Endeavour's* crew for STS-77—Commander John Casper; Pilot Curt Brown; and Mission Specialists Andy Thomas, Dan Bursch, Mario Runco and Marc Garneau—will fly to KSC on Monday to begin a dress rehearsal countdown. The Terminal Countdown Demonstration Test is set for Tuesday and Wednesday.

Shuttle managers plan to meet May 7 for a Flight Readiness Review, following which an official launch date will be announced.

Meanwhile, *Columbia* is in the Bay 2 shuttle hangar being readied for a late June launch



on STS-78, the Life and Microgravity Sciences-1 mission. Early this week, the three main engines were installed in *Columbia*. On Monday, the LMS-1 Spacelab will be installed in the transport canister, moved to *Columbia's* processing hangar and installed into the shuttle cargo bay on Tuesday.

*Atlantis* completed a ferry flight back to KSC from Edwards Air Force Base atop the 747 Shuttle Carrier Aircraft with a landing in Florida at 12:41 p.m. CST April 12. *Atlantis* was demated from the SCA that evening, and it was

inside the Bay 1 processing hangar by early Saturday morning. Technicians opened the payload bay doors on Monday and removed the ferry flight tail cone on Tuesday. The Spacehab module was removed from the cargo bay on Thursday.

Throughout the week, post-flight inspections of *Atlantis* have been under way, and work has begun to pinpoint the source of a hydraulic fluid leak in the aft compartment of *Atlantis* that was noted during STS-76. *Atlantis's* three main engines will be removed April 29. *Atlantis's* next mission, in August, will be the fourth shuttle-Mir docking, STS-79, retrieving Astronaut Shannon Lucid.



Russian dancers were one of the featured attractions at the STS-1 anniversary party. More than 800 JSC employees enjoyed music, dancing and Space Center Houston attractions. The event was a celebration of several milestones including the fifteenth anniversary of STS-1, the 35th anniversary of Yuri Gagarin's flight on Vostok 1 and the third year of the sister city relationship between the city of Nassau Bay and Star City, Russia.

JSC photo by Benny Benevides

## Shuttle contracts take initial step in consolidation

By James Hartsfield

NASA and its major space shuttle contractors took an important step last Friday toward consolidating shuttle operations and processing work under a single prime contractor.

Two novation agreements signed Friday that became effective over last weekend designate United Space Alliance as the prime contractor for both shuttle processing work currently performed by Lockheed Space Operations Company at the Kennedy Space Center and shuttle operations work currently performed by Rockwell Space Operations Company JSC. United Space Alliance is a joint venture announced last year by Rockwell International Corp. and Lockheed Martin Corp. in preparation to compete for NASA's request for a single space flight operations contract.

In November 1995, NASA an-

nounced its decision to pursue a single space shuttle operations contract on a non-competitive basis with USA. The novation activities are designed to ease the transition to a single contract. Together, Rockwell and Lockheed Martin already hold almost 70 percent of the dollar value of all space shuttle-related contracts.

"This agreement basically constitutes a name change for contracts that will essentially remain intact for the near term," said Space Shuttle Program Manager Tommy Holloway. "However, it is significant in that it is the first phase of a transition to a single contract and it constitutes the first official contract between USA and NASA. This allows us to get an early start on implementing a single space flight operations contract approach, and it supports our requirement that the transition to that contract is efficient

Please see **NOVATION**, Page 4

## Mir crew celebrates first human in space, STS-1

By Kyle Herring

The Mir-21 crew spent last week conducting experiments, monitoring others and performing some minor maintenance procedures as part of routine activities on the Russian Mir Space Station. The week included a number of television downlinks of the crew talking with family members, school children and reporters about life on an orbiting laboratory.

The week ended with the crew celebrating Cosmonautics Day and the 15th anniversary of the first space shuttle launch. Family members and friends talked with the crew on a two-way video link to celebrate the 35th anniversary of the first human in space—

Yuri Gagarin's flight in 1961. The cosmonauts also recognized last Friday's anniversary of STS-1.

This week the crew continued work with the Optizon Liquid Phase Sintering Experiment, or OLIPSE. Sample processing has continued nearly every day with the crew producing metallurgical samples in vials heated in a high temperature furnace on Mir.

Acceleration measurements are being taken aboard the station at various locations to help scientists determine the best and worst locations for experiment



operations. The Space Acceleration Measurement System, or SAMS, is strategically placed to characterize the environment of the laboratory. SAMS records fluctuations that will allow scientists to interpret results of investigations and to learn how to avoid regions of the station that are highly susceptible to movements.

Daily monitoring of the quail eggs is being conducted as are periodic fixations of eggs throughout the mission at various stages of development. Thus far, eight eggs have been fixated and Cosmonaut Researcher

Shannon Lucid reported seeing embryo development in some eggs.

Last Thursday, Commander Yuri Onufrienko, Flight Engineer-1 Yuri Usachev and Lucid took part in two press conferences—one with Russian media and one with American media—to discuss the mission, life in space and the anniversaries. Questions during the Russian press conference ranged from where they sleep to what language they speak on the station. That question elicited a joking response from Usachev, who said "Mainly Russian, but we try to learn more English words so Shannon won't forget her

Please see **MIR**, Page 4

## NASA Road 1 work begins in May

Long-awaited project to improve access to JSC, Clear Lake area

The Texas Department of Transportation recently awarded a contract to begin work on the widening of NASA Road 1 in front of JSC. Survey crews already are marking the edges of the new right-of-way and underground utilities.

Construction activities on this \$16 million first phase of the project will begin in May. Phase 1 includes construction of a six-lane undivided roadway with continuous center left turn lane from just east of Clear Lake Park to Space Center Blvd. A three-lane-wide new bridge will be constructed over Clear Lake alongside

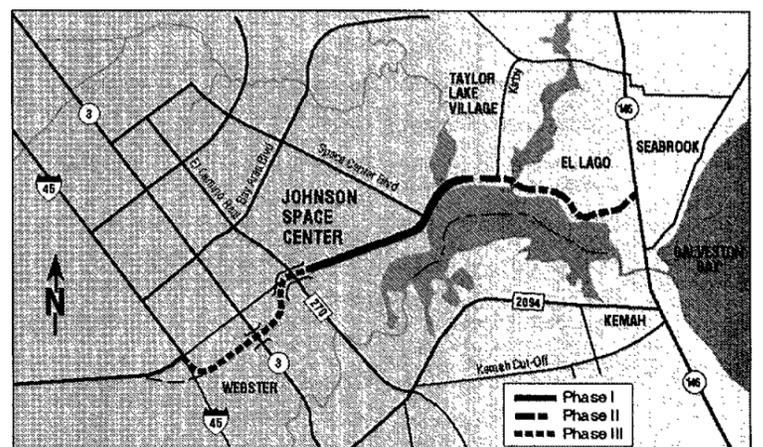
the present Mud Lake bridge to avoid damaging the stone wall in front of the former Jim West Mansion which is now on the National Register of Historic Buildings.

At Space Center Blvd., the roadway becomes divided with a broad, landscaped median and protected left turn lanes. Near St. John's Medical Center, the roadway becomes eight lanes wide with a landscaped median until just west of Space Center Houston. At that point the landscaped median terminates and the eight-lane roadway becomes undivided with a continuous

center left turn lane. At Nassau Bay Drive the roadway will transition back to the present four lane roadway as it approaches the Cow Bayou bridges.

The portion of the project in front of JSC includes a highly landscaped median and hike-bike trails. Both the City of Nassau Bay and the Clear Lake Chamber of Commerce are reviewing proposals for monument signs and other indicators of this area's aerospace heritage that can be included in the landscaped median near JSC.

Please see **NASA**, Page 4



Road work on NASA Road 1 will be conducted in three phases during the next three years. Phase 1 is set to begin next month. Phase 2 will begin in 1997 and Phase 3 in 1999.

JSC

# Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

**Houston International Festival:** April 20-21 and April 27-28. Tickets cost \$2.25. Supersaver cost \$10.50 and includes admission for four days and free parking.

**Casino trip:** Players Island bus trip April 27. Tickets cost \$5.

**Home tour:** Galveston Historic Home Tour May 4-5 and May 11-12. Tickets cost \$13.50.

**Concert:** Bay Area Chorus presents "Music of the Americas," at 8 p.m. April 26 at the Bay Harbour United Methodist Church. Tickets cost \$8 for adults and \$5 for students and seniors.

**Astroworld:** One day pass cost \$17.25.

**Fiesta Texas:** One day pass cost \$17.25.

**Six Flags:** One day pass cost \$17.25.

**Sea World:** Adult tickets cost \$24.50, Children (3-11) cost \$17.25.

**Space Center Houston:** Discount tickets, adult, \$8.75; child (3-11), \$7.10.

**Movie discounts:** General Cinema, \$4.75; AMC Theater, \$4.50; Sony Loew's Theater, \$4.75.

**Stamps:** Book of 20, \$6.40.

**JSC history:** *Suddenly, Tomorrow Came: A History of the Johnson Space Center.* Cost is \$11.

**Metro tickets:** Passes, books and single tickets available.

**Upcoming events:** Caribbean Getaway Sept. 13-20. Cost is \$359. Deposit of \$200 due July 8. Mexico Cooper Canyon Trip Nov. 6-12. Cost is \$995. Deposit of \$200 due Sept. 6.

JSC

# Gilruth Center News

**Sign up policy:** All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

**EAA badges:** Dependents and spouses may apply for photo identification badges from 7 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

**Fitness Challenge:** 1996 Fitness Challenge runs to Aug. 31. Employees are eligible to win \$100 gift certificates. For more information call Larry Wier at x30301.

**Defensive driving:** One day course is offered once a month. Cost is \$25. Interested employees should call the Gilruth.

**Stamp club:** Meets at 7 p.m. every 2nd and 4th Monday in Rm. 216.

**Women's self defense:** Martial Arts training for women only from 5-6 p.m. Tuesdays and Wednesdays. Cost is \$25 a month.

**Weight safety:** Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. April 25. Pre-registration is required. Cost is \$5.

**Exercise:** Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays.

**Aikido:** Martial arts class meets from 6:15-7:15 p.m. Tuesday and Wednesday. Cost is \$25 per month. New classes begin first of each month.

**Aerobics:** Class meets from 5:15-6:15 p.m. Tuesday and Thursday. Cost is \$32 for eight weeks.

**Ballroom dancing:** Cost is \$60 per couple. For additional information call the Gilruth Center at x33345.

**Country and Western dancing:** Beginner class meets 7-8:30 p.m. Monday. Advance class meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

**Fitness program:** Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

JSC

# Swap Shop

## Property

Sale: Brook Forest, 4-2-2, 2300 sq ft, FPL, new carpet/paint/tile, A/CH, \$135k. Brian, x2635 or 480-4351.

Sale: Laporte/Creekmont, 3-2-2, FPL, new roof, new carpet/linoleum, fresh paint, \$63.9k. 992-5080.

Sale: Friendswood, Heritage Park Village, 3-2-5-2+ opt 4 BR, 2137 sq ft, ex cond, \$110k. 992-4043.

Sale: Wooded lot 90'x135' in Taylor Lake Estates, \$39.5 can finance. Don, x38039 or 333-1751.

Sale: League City, 3-2-2 house, 3 acres, barn, pond, beautiful setting, lots of trees, \$135k. 554-6138.

Lease/Sale: The Landing, condo, 2-1, carport, 900 sq ft, W/D, all bills paid, \$600 mo. Carol, 326-2714.

Lease: Heritage Park, 3-2-2, call for appointment, avail 1 June. 482-2921.

Lease: League City, 2-1, appli, W/D, enclosed spa in backyard, all bills pd, \$550 mo + dep. Bill, 332-3649.

Sale/Lease: CLC, Bay Glen, 3-2-2, near school, pool & park, \$107k or \$1075. 486-5072.

Lease: furnished exec efficiency, all amenities, fax name, address & phone to 713-334-4660.

Rent: Seabrook, 3-2.5, appli, W/D, alarm system, nice neighborhood, \$1k mo + dep. Jeri, 333-7552.

Rent: Garage/workshops, both in Dickinson, 15' x 20', \$100 mo. 15' x 30', \$115 mo. Larry, x33168 or Carol, 393-2820.

Sale: Waterfront lots at Ivanhoe, 7 mi south of Woodville, wooded, septic tank, on asphalt road, \$25k obo; 6 inter lots at Ivanhoe, wooded, on asphalt road, -120' x 70', \$1k/lot. 471-5757.

Sale: "The Park" subdiv, Friendswood, 1/3 ac, all utility security, ready to build, \$50.5k. Katie, x33185.

Rent: Rooms in Seabrook home, female preferred, w/child OK, coop students considered. Mike, x34823.

Lease: Waterfront TH w/boat slip, 2-2.5-2, W/D, FPL, microwave, frig, fans, sec gates. x35268 or 326-4915.

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'87 Hyundai hatchback, maroon, 69k mi, looks & runs good, no A/C, \$1k obo. x35452 or 332-5731.

'37 International 1/2 ton pickup, original, engine fires, restorable, \$1600. 996-5835.

'93 Chevy Extended Cab, 5 spd, 50k mi, \$10.6k. Eric, x32903.

'94 Dodge Intrepid, 3.5 L V6, P/S/P/B, auto, 4 dr, A/C, ex cond, \$14k obo. Bob, x30865 or 438-4035.

'93 Suzuki Samurai Sport utility vehicle, 5 spd, white w/2 black tops, \$5k. Bill, 332-3649.

'86 Mazda RX7 GXL, active suspension, sunroof, antitheft, extras, \$3k. x30329 or 482-8019.

'87 Toyota Tercel, 3 dr, beige, 4 spd, AM/FM/cass, 41k mi, ex cond, \$2.5k. Robert, x48654 or 480-3052.

'90 Pontiac Sunbird convertible, white/black top, A/C, auto, P/W, P/L, \$6k. x36027.

'93 Ford Ranger Supercab, 4.0 V6, A/C, towing pkg, under warranty, \$12k. x36027.

'91 Geo Metro, 4 dr, 5 spd, red, 34.5k mi, A/C, AM/FM, ex cond, \$4.2k. Bob, 482-5984.

'79 Datsun 280ZX coupe, 5 spd, A/C, 97k mi, \$1.4k. 280-8608.

'86 Olds Cutlass Supreme Brougham, 4 dr, P/W, P/S, AM/FM/cass, new A/C, 83k mi, \$2.5k. 280-0991.

'81 Olds Cutlass, rebuilt 260 V8, auto, P/S, P/B, A/C needs to be fixed. 338-4470.

'84 BMW 318i, white, sunroof, 5 spd, good cond, looks new, low mileage, \$6.5k nego. 991-0821.

'91 Firebird, red, T-tops, loaded, ex cond, \$8,995. 337-1311 or 409-938-3491.

'89 Ford F-150 ext cab PU, V8, 5 spd, 75k mi, XLT pkg, \$6k. 486-0169.

'91 Honda Civic, 3 dr hatchback, 4 spd, new tires, ex cond, 46k mi, \$6.2k. x37254 or 486-5741.

'86 Honda Prelude Si, sunroof, tinted windows, auto, good cond, \$3k. Lisa, x40213 or 554-4140.

'80 Subaru, 5 spd, 4 dr, runs good, many new parts, \$1k obo. Mike, x34823 or 474-5252.

'88 Monitor travel trailer by Rambler, 29' w/walk-thru bath & front kitchen, twin beds, sleeper sofa, dinette bed, awning, ex cond, \$11.5k. 482-8882.

'94 Camaro, maroon, A/C, cruise, cass, new tires, 5 spd, alloy wheels, 45k mi, \$10.8k obo, x31443 or 997-8044.

'92 Alfa Romeo Veloce, silver, loaded, 5 spd, 23k mi, ex cond, \$14.5k nego. Wayne, 409-938-3408.

'76 Buick Regal, 2 dr, blue, 350 V8, 81.5k mi, good cond, \$1,150. Conner, x38193.

'82 Corvette Collectors Edition, 42k mi, show car cond, loaded, garaged, \$14,850. Larry, x30559.

'92 Kawasaki Jet Ski SuperSport, trailer, life vest, \$3.5k obo. 488-5962.

Windsurfing equip, Mistral Challenge Flex, \$75; Bic Rap, \$375; Westwind, \$175, sails & extra equip. Dave, 486-8487.

Custom made boat cover for 18' center console, \$150. James, x36666.

'91 Harley Davidson Sportster Deluxe, 883 cc, ex cond, 12k mi, \$6.5k. x34908 or 409-925-7224.

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## Today

**AIAA workshop:** The American Institute of Aeronautics and Astronautics will host a workshop on automation and robotics beginning at 8 a.m. April 19 at the Center for Advanced Space Studies. For more information call Misty Armstrong at 333-4419.

**Reservations due:** The NASA JSC Chapter of the National Management Association will meet at 5 p.m. April 25 at the Gilruth Center. Greg Hayes and Wayne Draper will discuss the JSC lead center transition status. Reservations must be made no later than noon April 19. For more information call Kathleen Kaminski at x38706.

**CTAP class:** The Career Transition Assistance Program will host a class on networking from 1-4:30 p.m. April 19 in Bldg. 45 Rm. 304. For more information call Amy Mendez at x32604.

**Cafeteria menu:** Special: fried chicken. Total Health: vegetable lasagna. Entrees: pollock hollandaise, beef stroganoff, vegetable lasagna. Vegetables: steamed broccoli, carrots vichy, Italian zucchini, breaded okra.

## Monday

**Reservations due:** The American Institute of Aeronautics and Astronautics will meet at 5:30 p.m. April 25 at the Gilruth Center. Robert Pandis will discuss "The B-2 Stealth Bomber: Revolution in Military Capability." Reservations are due April 22. For additional information call Misty Armstrong at 333-4419 or Barbara Weems at 333-6276.

**Cafeteria menu:** Special: meat sauce and spaghetti. Total Health: potato baked chicken breast. Entrees: wieners and beans, sweet and sour pork chop, potato baked

chicken, steamed fish, French dip sandwich. Soup: cream of broccoli. Vegetables: French cut green beans, seasoned rice, California vegetables, buttered beans.

## Tuesday

**BAPCO meets:** The Bay Area Personal Computer Organization will meet at 7:30 p.m. April 23 in the Community Room at League City Bank and Trust, 300 East Main St. Richard Melvin will discuss Networking. For more information call Guy Thibodaux at 333-5340.

**Cafeteria menu:** Special: smothered steak with dressing. Total Health: baked potato. Entrees: beef stew, liver and onions, shrimp Creole, baked chicken, fried cod fish, French dip sandwich. Soup: navy bean. Vegetables: steamed rice, seasoned cabbage, corn O'Brien, peas.

## Wednesday

**Toastmasters meet:** The Space-land Toastmasters will meet at 7 a.m. April 24 at the House of Prayer Lutheran Church. For more information call Jeannette Kirinich x45752.

**Astronomers meet:** The JSC Astronomy seminar will meet at noon April 24 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information call Al Jackson at x35037.

**Cycle club:** The Space City Cycle Club will meet for a 25-mile ride beginning at 6 p.m. April 24 at the University of Houston Clear Lake soccer field. For more information on this ride and weekend rides call Mike Prendergast at x45164.

**Cafeteria menu:** Special: salmon croquette. Total Health: baked potato. Entrees: roast pork, stir frybaked perch, steamed fish, vegetable lasagna, Reuben sandwich. Soup:

seafood gumbo. Vegetables: mustard greens, okra and tomatoes, vegetable sticks, lima beans.

## Thursday

**Radio club meets:** The JSC Amateur Radio Club will meet at 7 p.m. April 25 at the Nassau Bay City Hall. For more information call Larry Dietrich at x39198.

**CTAP class:** The Career Transition Assistance Program will host a class on Phone Skills from 1-4:30 p.m. April 25 in Bldg. 45 Rm. 304. For more information call Amy Mendez at x32604.

**Cafeteria menu:** Special: stuffed cabbage rolls. Total Health: baked potato. Entrees: beef tacos, ham and lima beans, pork and beef egg rolls, steamed fish, catfish, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, green beans, buttered squash, pinto beans.

## Friday

**Spring concert:** The Bay Area Chorus presents "Music of the Americas," 8 p.m. April 26 at the United Methodist Church. Tickets are on sale at the Bldg. 11 Exchange Store. For additional information call Irene Piatek at x39043.

**Cafeteria menu:** Special: baked chicken. Total Health: roast beef au jus. Entrees: deviled crab, baked chicken, beef cannelloni, steamed pollock, Reuben sandwich. Soup: seafood gumbo. Vegetables: seasoned carrots, peas, breaded okra, steamed cauliflower.

## May 2

**Warning system test:** The site-wide Employee Warning System will undergo its monthly audio test at noon May 2. For additional information call Bob Gaffney at x34249.

EZ storage, \$60; qn sz waterbed w/bookcase headboard, zero damping mattress, heater sys, padded side boards, \$85. Vince, x34088.

Glass coffee table & 2 glass end tables, ex cond, \$175 obo; glass dining table, no chairs, \$125 obo; VCR, \$35. 480-2870.

Student desk w/hutch, \$80. x38274 or 486-5072.

Free kg sz waterbed, 5 yrs old, good cond, needs heater unit, just come pick it up. 474-3667.

Sylvania 25" color TV, swivel base console, remote, \$170 obo. Wilbur, x39367 or 482-9479.

Lounger/recliner, brown, ex cond, \$25. Mary, x36518 or 486-1766.

Sleeper sofa & loveseat, pastel floral design, good cond, \$125. Frank, 282-3858 or 486-8504.

## Wanted

Want rear bumper for '86 Nissan PU. 480-7138.

Want used pop-up camper to sleep 6-8. 280-8643.

Want riders to join VPSI Vanpool, depart South Braeswood Park & Ride lot, 6:50 a.m. for JSC & offsite locations, 7:30-4:30 shift. Susan Gaynor, 282-5447, or Al Ruder, x34997.

Want roommate to share home on Taylor Lake, 2 private rms, own bathroom, garage space negotiable, prefer professional, non-smoker, \$400/mo plus 1/2 util. 283-4237 or 291-9469.

Want screen writers to form a support group. Lora, x34920 or Michael, x38169.

Want non-smoking roommate to share 3-2.5 TH in Clear Lake area, big-screen TV, W/D, all privileges, bills paid, \$350/mo. John, x30543 or 286-7384.

Want non-smoking female to share 3-2-2 w/same. \$350 dep, \$300/mo incl all util but phone. 322-8417.

Want housemate to share 3-2.5 4-story waterfront TH, South Shore Harbour area, garage, storage space, \$550/mo + 1/2 util. Terry, x39234 or 335-0113.

Want turntable that plays 33-1/3 speed records. Dennis, x31409.

Want non-smoking roommate to share 4 BR house, Glen Bay Manor in CLC, \$300/mo + dep w/bills paid. x38274 or 486-5072.

Want non-smoking female roommate to share 4 BR house in LC, \$300/mo all bills paid. 332-6178.

Want Ford Maverick paraphernalia, models, push toys, posters, etc, at least fair cond. Scott, 282-0484.

Want space memorabilia, flown items, utensils, clothing, autographed photos, covers, letters relating to Mercury, Gemini, Apollo, Skylab, Shuttle. Richard, 481-8080.

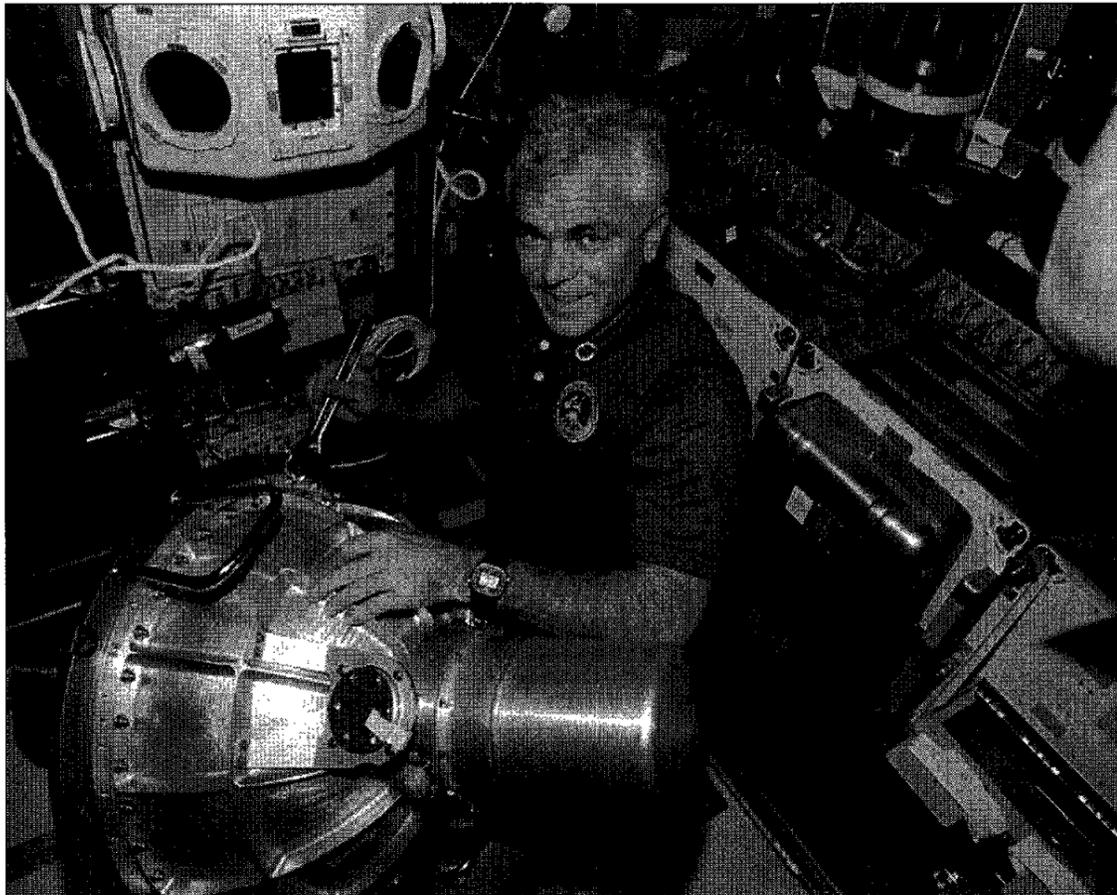
Want old fishing lures from the '50's and earlier. Tim, x38843 or 409-925-5011.

Want baby boy clothes, good cond, sz 24 mo and larger; baby crib, \$25 or less. Sarah Osborn, x47384 or 474-3960.

Want considerate, non-smoking housemate to share 3-2-2 w/bath and garage, Bay Glen/CLC. \$335/mo + \$200 dep, 1/2 util. Larry, x33168 or 488-7460.

Want 33mm Pentax camera, trying to match Macro lens. 486-8963.

Want 35mm carousel projector in good working order. David Pitts, 488



# Triple Play

## For third time, *Atlantis* docks with Russia's Mir Space Station



Usually, it would be considered "bad form" to launch a space shuttle with six crew members and land with only five. But on STS-76, that was the plan all along.

Commander Kevin Chilton, Pilot Rick Searfoss and Mission Specialists Ron Sega, Linda Godwin and Rich Clifford left crew mate Shannon Lucid aboard the Russian Mir Space Station for a five-month stay on the science outpost.

Lucid's stay marks the beginning of a continual presence in space for U.S. astronauts. In addition, the five members of *Atlantis*' crew gave credit for the perfect flight to exceptional teamwork both in space and on the ground and returned with photos to share.

From left to right, top to bottom:

- 1) Clifford prepares to move a gyrodyne from *Atlantis* to Mir. The gyrodyne—which provides attitude control and stability—was later installed in the base block module on the station.

- 2) Back-dropped against an array of clouds over the south Pacific Ocean, the Mir is seen from the aft flight deck of *Atlantis*.

- 3) The "Spirit of '76" in-flight crew portrait includes, front row from left, Godwin, Chilton and Searfoss. Back row from left are Clifford, Lucid and Sega.

- 4) After docking, Lucid, right, becomes part of the Mir 21 crew

that includes Commander Yuri Onufrienko, left, and Flight Engineer Yuri Usachev.

- 5) Once the hatches between the two spacecraft are opened, an in-space tradition continues with Chilton, right, shaking hands with Onufrienko in the tunnel connecting *Atlantis* to the Russian space station.

- 6) For the first time in space history, Clifford performs a space walk while *Atlantis* is attached to the Mir station. Clifford works to place experiments on the docking module of the Mir to analyze the space environment around the station.

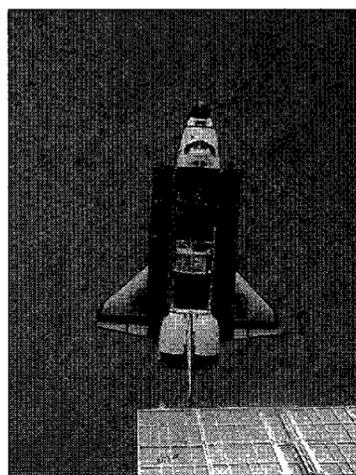
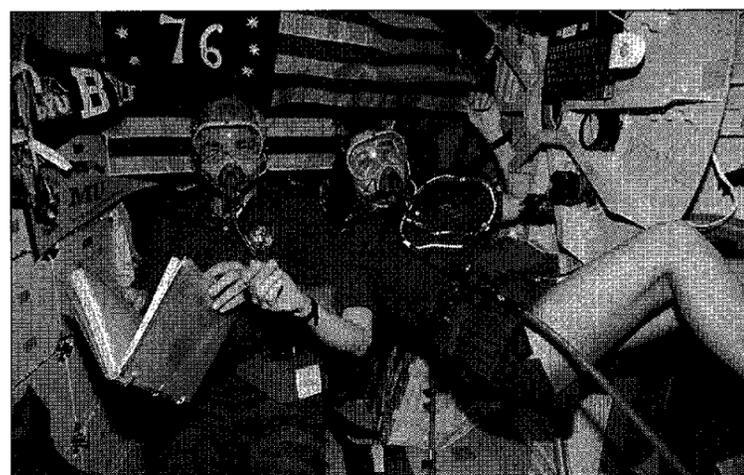
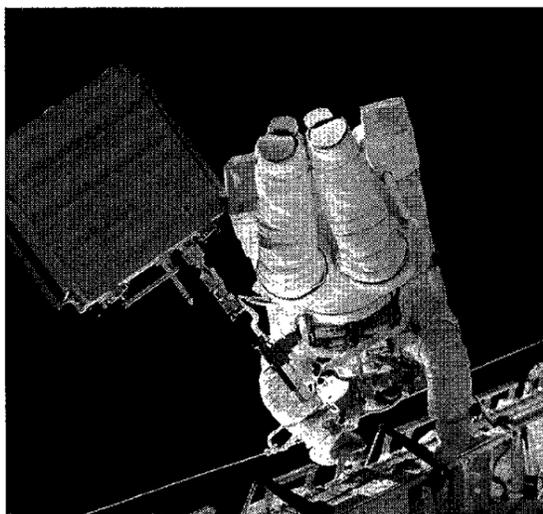
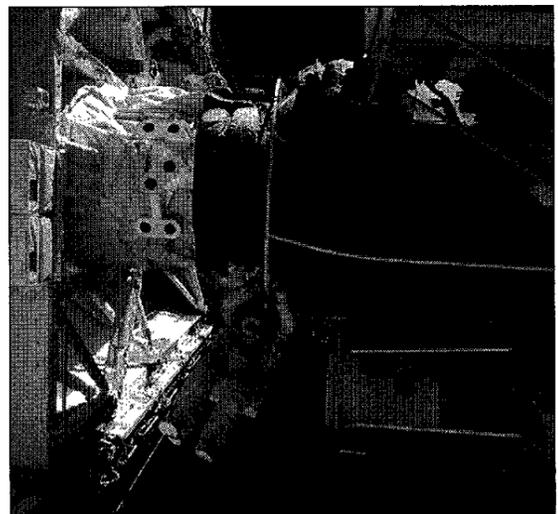
- 7) Godwin joins Clifford in performing space history with the first docked space walk and makes her way from *Atlantis*' cargo bay with the Mir Environmental Effects Payload, or MEEP, to the Docking Module on Mir.

- 8) Searfoss traverses through the maze of Mir's modules with camera in hand.

- 9) Clifford, left, and Godwin pre-breathe—a normal procedure for space walkers—to prepare for their space walk to the Mir docking module.

- 10) A "floor" of clouds is the backdrop for *Atlantis* during rendezvous and docking operations with the Mir.

- 11) In Mir's base block module, Lucid prepares to bid farewell to the STS-76 crew. From left are Chilton, Lucid and Sega. □



# Utah State University develops space wheat crop

The first crop developed specifically for growth in space has been developed at Utah State University.

A space-age wheat, USU-Apogee, produces the equivalent of almost 600 bushels of grain per acre—three times the top yields from most fields. It took more than a decade to develop a wheat suitable for space farms, where artificial sun always shines, carbon dioxide levels are high and space is a premium. Apogee thrives under those conditions. Its heads emerge 23 days after germination.

So far, Apogee's baking characteristics pass muster, at least on Earth. Making bread in space is still uncharted territory. On long-duration space missions, it will be more economical to provide life support supplies by producing food, such as Apogee, potable water and breathable air by recycling metabolic and other wastes. It's not known whether the new variety will make it to the moon or Mars, but it's likely to be grown on the International Space Station scheduled for completion in 2002.

"We're tickled to death with Apogee," said space scientist Doug Ming, of JSC Space and Life Sciences Directorate. "We're seeing much higher yields than the other varieties we've tried. It's also much shorter."

Bruce Bugbee, the USU crop physiologist who developed the variety, has worked with NASA for almost 15 years. He heads a NASA-supported university research facility to develop food crops for space in a complex consisting of 30 computer-controlled growth chambers of various sizes, in addition to several greenhouses.

Previously, the only wheat to be grown in space was Superdwarf, a short line that Bugbee originally found in Mexico. Apogee, which is the term for the point in orbit farthest from Earth, is a dwarf hard red spring wheat, developed from thousands of segregating lines. It produces few tillers, or branches, which tend to sap energy that a plant devotes to grain production.

"Superdwarf required perfect conditions for growth. Apogee doesn't," Ming said.

## Earth Day celebration is Monday

"Support Your Local Planet" is the theme for this year's Earth Day celebration, set for 10 a.m.-2 p.m. Monday in Teague Auditorium.

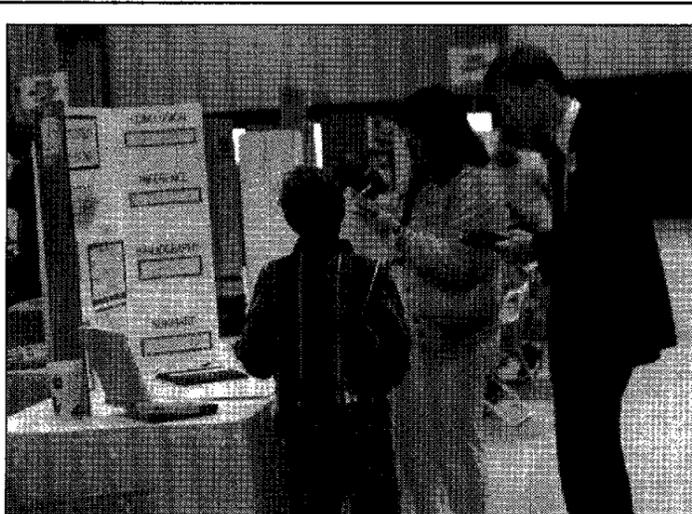
"The celebration is JSC's way of participating in the worldwide Earth Day observance," said coordinator Jo Kines of the Plant Engineering Division's Environmental Services Office. "Earth Day is an annual opportunity for people around the world to explore our natural environment and to examine what can be done to protect and enhance it."

The JSC celebration will include 25-30 exhibits by local organizations and environmental agencies who will provide information on Earth friendly subjects. There will be contests, door prizes and an astronaut signing session from 11 a.m.-12:30 p.m.

In addition to the exhibits, four short workshops have been scheduled by local area experts, each lasting from 30-60 minutes. At 10 a.m., "Birding in the Houston Galveston Area" will be the featured topic. At 11 a.m. the focus will be "Environmentally Designed Homes for Southern Climates." At noon "Organic Gardening and Landscaping," will be the topic of discussion and at 1 p.m. "Native Plants of the Houston Galveston Area," will be discussed. The workshops will be held in Rm. 122 of Teague.

"That first Earth Day helped create the modern environmental movement, as well as the first environmental legislation—the Clean Air and Clean Water Acts," Kines said.

Kines said JSC is committed to supporting environmental protection and is pleased to provide this opportunity to enhance environmental awareness. For more information about Earth Day activities, call Kines at x33218.



Stacey Morrison, center, and Stephen Fredrickson question a student in the junior category about his project during the 37th annual Science Fair of Houston. More than 1,350 projects were entered into the fair this year.

## JSC volunteers help judge Houston Science Fair entries

Fourteen JSC employees took time out last month to judge science projects at the 37th annual Science Fair of Houston.

The Space and Life Sciences Directorate awarded two internships and JSC employees handed out 12 Public Affairs Education Awards to students in junior, ninth and senior classes competing in chemistry, computers, Earth and space science, engineering, mathematics and physics.

"It was very interesting and there were many very good projects," said Mike Powell, who along with fellow Space and Life Science co-worker Gerald Taylor awarded two Life Science internships at the fair. "There were some individuals that were repeat winners that indicate there are some very talented young people in our area. I was quite impressed by them."

The Public Affairs Office Education award judges included Stacey Morrison of the Legal Office, Jim Poindexter of Public Affairs; Todd Gaspard of Flight Crew Operations; Cathy Kramer, Stephen Fredrickson and James Carpenter of the Engineering Directorate; Todd May of the Space Station Project Office; John Jackson and Lynn Bachemeyer of Space and Life Sciences; and Bob Herman of Hamilton Standard. Awards were chosen in more than 1,350 projects entered this year.

The fair is devoted to the enhancement of math and science education in junior and senior high schools. More than 90 businesses including JSC presented awards to students while top winners received scholarships and a chance to compete at the International Science and Engineering Fair.

## JSC Legal office to host employee briefings soon

The Legal Office will host briefings on April 29 to explain changes in the law regarding employee participation in political activities.

Briefings that focus on the 1993 Reform Amendments to the Hatch Act will be held from 11 a.m.-noon and 1-2 p.m. April 29 in the Bldg. 30 auditorium.

"In this political election year, we would like to have the opportunity to explain the very broad changes to the civil service workforce," said Dan Remington, assistant chief council for general legal matters. "Those amendments relaxed prior restrictions on most JSC employees regarding active participation in partisan political activities."

The Hatch Act was originally passed in 1939 and determined that partisan political activity by federal employees must be limited for public institutions to function fairly and effectively, Remington said. The law prohibited direct action to assist partisan candidates or political parties in

campaigns, and prohibited soliciting or collecting political contributions, distributing campaign materials, selling fund-raising dinner tickets or otherwise promoting activities such as political dinners, he added.

On Oct. 6, 1993, President Clinton signed the Hatch Act Reform Amendments of 1993. The amendments became effective on Feb. 3, 1994, and the Office of Personnel Management subsequently published regulations in September 1994. Although the prohibitions expressed in the original law are still applicable to career senior executive service employees, most all of the previous restrictions, except those relating to political fund raising and partisan activities in the federal workplace or on official duty, have been removed, Remington said.

In addition, employees who have not fulfilled their ethics training requirement for this year may do so by attending this briefing. For details call the Legal Office at x31004.

## Novation merges shuttle work

(Continued from Page 1)  
and, above all, safe."

The eventual consolidation of NASA's Space Flight Operations under a single contract is expected to reduce shuttle costs by streamlining contractor operations and eliminating duplicative work while maintaining flight safety as the ultimate priority. NASA's involvement in the day-to-day operations of the space shuttle program also is expected to decrease as greater accountability is shifted to the contractor.

The two novation agreements signed last Friday, one covering

the space operations contract, NAS9-18000, with Rockwell Space Operations Co., and another covering the shuttle processing contract, NAS10-10900, with Lockheed Space Operations Co., will eventually consolidate all work from the two largest shuttle operations contracts with USA. However, in the near future, no terms or conditions of the two contracts will change and USA will immediately subcontract the same work to RSOC and LSOC that they had previously performed under their respective contracts with NASA.

## 'Take Our Children to Work Day' program changes location

The April 25 "Take Our Children to Work Day" program has changed locations and expanded to include a lunch special in the JSC Cafeterias.

The program, set to begin at 8:30 a.m., will now be presented in Teague Auditorium. Invited speakers including scientists, engineers and NASA astronauts will provide an inside look at the professional opportunities in a wide range of disciplines in the space program. The presentations will conclude at 10:30 a.m. and each child may then spend the remainder of the day observing and sharing in his/her sponsor's normal business activities.

The JSC Cafeterias also will offer a special lunch for children that will include a hamburger, fries and a drink for \$1.65.

Any employee may bring a maximum of one child between the ages of 9 and 15 to Teague at 8 a.m. The children do not have to be badged individually, but need to be escorted at all times by his/her badged sponsors. Employees may register for the lunch special, request an interpreter or sponsor a child by filling out a form available in the EOPO or through their directorate's administrative officer. For more information call Lupita Armendariz at x30604.

## Mir 21 crew talks with Russian students

(Continued from Page 1)

English." The crew also said it was preparing for the arrival of the new-science module Priroda scheduled for launch later this month.

Last Tuesday, the crew answered questions from high school students at the Ulyanovsk school located about 200 miles outside of Moscow, taking part in the Fourth Aerospace Festival. Questions to all crewmembers on Mir ranged from where the station was currently located, to whether the two cosmonaut crew members were planning to vote in

the June presidential election. The cosmonauts said they planned to vote absentee, but hadn't decided for which candidate they would vote.

The crew's work schedule is laid out in the form of a cyclogram, which is similar to a shuttle flight plan. The cyclogram is generated four days ahead with real-time modifications and inputs sent to the crew via radiograms or messages. A group of experts from NASA is serving as consultants to the Russian flight control team for scheduling and is on duty in the Mission Control Center in

Kaliningrad, throughout the crew's work day. Mir's final science module, Priroda or 'Nature,' is ready for launch from the Baikonur Cosmodrome complex. The shroud and nosecone were installed two weeks ago and the final management meeting—the Russian version of the flight readiness review—was conducted Monday. The module was transferred to the launch processing facility for integration into its Proton rocket on Tuesday. Priroda will be used to study the Earth for ecological and environmental purposes.

## NASA Road 1 construction near JSC to be done during weekends

(Continued from Page 1)

Center Operations Director Jim Hickmon assisted with the effort and hailed this project as the first step for greater mobility for both JSC and the Clear Lake area.

"This project has been in the planning stages for over 20 years" Hickmon said. "Not only will it give center employees and contractors better access, it will increase area mobility and be a real boon to the Clear Lake economy. We know there will be some inconvenience as construction moves across the front of the center, but we are very pleased with the cooperation we have received from TXDOT officials to minimize impact on both the center and employees."

"There are two intersections that

are critical to the movement of traffic to and from the center," said Don Holick, Architect/Master Planner of JSC's Facility Development Division. "The Third Street and the Saturn Lane intersections with NASA Road 1 carry over 50 percent of our traffic volume. TXDOT proposed that work on these intersections be done on evenings and weekends when routine JSC traffic is lightest. Additionally, TXDOT is using a special concrete mix at these intersections that allows traffic to use the roadway within 24 hours after pouring. The net result is that an intersection will be torn up on Friday evening and be reopened to traffic on Monday morning."

"We had full input with the

TXDOT project engineers in their development of a construction phasing plan," Holick added. "They share our concern for movement of traffic to and from the center and along NASA Road 1 during this lengthy construction process and TXDOT engineers have gone the extra mile to minimize inconvenience to Center employees."

Phase 2 of the NASA Road 1 project, which includes a six-lane undivided roadway with continuous center left turn, extends from Clear Lake Park eastward to Highway 146 in Seabrook. This phase, which has been delayed for about a year to preserve wetlands at three bridge crossings, is now scheduled to start in early 1997

and be completed in late 1999.

Phase 3, forecast to begin in 1999, includes construction of a new roadway from the Cow Bayou bridges at Nassau Bay to Interstate Highway 45. This portion of the project will be a limited-access, six- and eight-lane divided roadway with overpasses at El Camino Real, Highway 3, and I-45. The new road will split from the existing NASA Road 1 at the Star Car Wash west of El Camino Real and move south through the Houston Lighting & Power Webster Generating Station tract and the Exxon tank farm, bypassing the eastern edge of the city of Webster as it reaches a new interchange with I-45. A subsequent project eventually will link this inter-

change to FM 528 near the entrance to Challenger Park.

The entire project is expected to cost about \$90 million, and is a federally funded project with matching state and local funds.

The Phase 1 contract was awarded to J. D. Abrams, Inc. of Austin. The construction, slated for a 30 month period, will work westward from the Clear Lake Park toward El Camino Real. The north half of the new concrete roadway will be constructed first and then the south lanes will be constructed, thereby minimizing inconvenience to traffic moving through the area. TXDOT has pledged to maintain at least four lanes open at all times during construction.